DOCKET: CU-2505 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application:	Dmitrii Stepanov et al.	]	
Serial No.:	09/831,995	]	GRP ART UNIT: 2828
Filed:	May 16, 2001	]	Ex.: A. Rodriguez
For:	Reduction of Pulsations in DFB Lasers	]	

NEW CLAIMS 69-89

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69. (New) A method of reducing power fluctuations in an output of a laser, the method comprising the steps of:

- generating a laser signal utilizing a distributed feedback laser cavity,
- redirecting a signal portion of the laser signal back towards the laser cavity, and
- inducing a saturable absorption grating in a saturable absorption element external to the laser cavity in the optical path of the laser signal as a result of wave mixing of the laser signal and the redirected signal portion,

whereby, in use, phase-discriminating properties of the induced saturable absorption grating in the optical path of the laser signal reduce power fluctuations in an optical output of the laser cavity.

70. (New) A method as claimed in claim 69, wherein the method further comprises the step of post-amplifying the laser signal externally from the laser cavity and prior to the redirecting of the signal portion of the laser signal.

71. (New) A method as claimed in claim 69, wherein the phase-discriminating properties of the induced saturable absorption grating provide a phase-conjugated feedback signal for reducing the power fluctuations in the optical output of the laser cavity.

72. (New) A method as claimed in claim 69, wherein the phase-discriminating properties of the induced saturable absorption grating provide a signal for resonant pumping as well as for saturating gain in the laser cavity.

73. (New) A method as claimed in claim 69, wherein the method comprises the step of generating the laser signal utilizing a plurality of laser cavities connected in series.

74. (New) A method as claimed in claim 73, wherein one saturable absorption element for external to the laser cavities, one saturable absorption grating and one optical redirecting element for redirecting the portion of the laser output are shared between the laser cavities.

75. (New) A method as claimed in claim 69, wherein the step of generating the laser signal comprises utilizing a Bragg grating structure.

76. (New) A method as claimed in claim 75, wherein the Bragg grating structure comprises one or more of a group comprising a chirped Bragg grating, a sampled Bragg grating, a phaseshifted Bragg grating, and an apodized Bragg grating.

77. (New) A laser structure comprising:

- a distributed feedback laser cavity for generating a laser signal,

- an optical signal redirecting element external to the laser cavity and disposed in the optical path of the laser signal for redirecting a signal portion of the laser signal back towards the laser cavity, and

- a saturable absorption element external to the laser cavity and disposed in the optical paths of the laser signal and of the redirected signal portion such that, in use, a saturable absorption grating is induced in the saturable absorption element in the optical path of the laser signal as a result of wave mixing of the laser signal and the redirected signal portion,

whereby, in use, phase-discriminating properties of the induced saturable absorption grating in the optical path of the laser signal reduce power fluctuations in an optical output of the laser cavity.

78. (New) A laser structure as claimed in claim 77, further comprising:

- an optical signal amplification element disposed in the optical path of the laser signal between the output of the laser cavity and the redirecting element, for post-amplifying the laser signal from the laser cavity.

79. (New) A laser structure as claimed in claim 78, wherein the saturable absorption element is disposed at one end of the signal amplification element in the optical path of the laser signal.

80. (New) A laser structure as claimed in claim 78, wherein the saturable absorption element is integrated with the signal amplification element in the optical path of the laser signal.

81. (New) A laser structure as claimed in claim 78, wherein one or more of a group comprising the laser cavity, the signal amplification element, and the saturable absorption element are formed from erbium doped fibre.

82. (New) A laser structure as claimed in claim 77, wherein the laser structure is arranged, in use, in a manner such that the phase-discriminating properties of the

saturable absorption grating provide a phase-conjugated feedback signal for the laser cavity.

83. (New) A laser structure as claimed in claim 77, wherein the laser structure is arranged in a manner such that, in use, the phase-discriminating properties of the saturable absorption grating provide a signal for resonant pumping as well as for saturating gain in the laser cavity to a threshold value.

84. (New) A laser structure as claimed in claim 77, comprising a plurality of distributed feedback laser cavities connected in series for generating the laser signal.

85. (New) A laser structure as claimed in claim 84, wherein one saturable absorption element and one optical redirecting element are provided in the optical path of the laser signal after the plurality of laser cavities and are shared by the laser cavities.

86. (New) A laser structure as claimed in claim 77, wherein the laser cavity comprises a Bragg grating structure.

87. (New) A laser structure as claimed in claim 86, wherein the Bragg grating structure comprises one or more of a group comprising a chirped Bragg grating, a sampled Bragg grating, a phaseshifted Bragg grating, and an apodized Bragg grating.

88. (New) A laser structure as claimed in claim 78, wherein one or more of a group comprising the laser cavity, the signal amplification element, the saturable absorption element and the optical redirecting element are in the form of planar waveguides.

89. (New) An external feedback device for a distributed feedback laser cavity, the feedback device comprising:

- an interconnecting element for coupling a laser signal from an output of the distributed feedback laser cavity into the external feedback device,

- an optical signal redirecting element disposed in the optical path of the laser signal within the external feedback device for redirecting a signal portion of the laser signal back towards the interconnecting element, and

- a saturable absorption element disposed in the optical paths of the laser signal and of the redirected signal portion within the external feedback device such that, in use, a saturable absorption grating is induced in the saturable absorption element in the optical path of the laser signal as a result of wave mixing of the laser signal and the redirected signal portion,

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whereby, in use, phase-discriminating properties of the induced saturable absorption grating in the optical path of the laser signal reduce power fluctuations in the optical output of the laser cavity.